

WHAT IS CLAIMED IS:

- 1                   1. A thin film magnetic head comprising:  
2                    a read unit, formed above a substrate, having a lower shield, a read element and  
3                    an upper shield; and  
4                    a write unit having a lower pole piece, an upper pole piece, and a coil placed  
5                    between said lower pole piece and said upper pole piece,  
6                    said read unit and said write unit being separated from each other with a non-  
7                    magnetic material;  
8                    wherein a magnetic material having a low coefficient of thermal expansion of  
9                     $11.5 \times 10^{-6}/K$  or less is used for forming at least part of the lower shield or the upper shield.
- 1                   2. A thin film magnetic head according to claim 1, wherein said magnetic  
2                    material having low coefficient of thermal expansion is a crystalline magnetic alloy.
- 1                   3. A thin film magnetic head according to claim 1, wherein said magnetic  
2                    material having low coefficient of thermal expansion is a NiFe alloy having a composition  
3                    comprising 30 to 55 wt% Ni.
- 1                   4. A thin film magnetic head according to claim 1, wherein each of said lower  
2                    shield and said upper shield has a structure of a multilayer.
- 1                   5. A thin film magnetic head according to claim 4, wherein said NiFe alloy layer  
2                    is used as a layer, except for layer closest to said read element.
- 1                   6. A thin film magnetic head according to claim 1, wherein at least one of said  
2                    lower shield and said upper shield is a laminated film consisting of a layer formed from said  
3                    magnetic material having low coefficient of thermal expansion and a layer formed from a NiFe  
4                    alloy having a composition mainly comprising 80 wt% Ni, said 80 wt% NiFe alloy layer facing  
5                    to said read element.
- 1                   7. A thin film magnetic head according to claim 6, wherein said magnetic  
2                    material having low coefficient of thermal expansion is a crystalline magnetic alloy.

1                   8. A thin film magnetic head according to claim 6, wherein said magnetic  
2 material having low coefficient of thermal expansion is a NiFe alloy having a composition  
3 comprising 30 to 55 wt% Ni.

1                   9. A thin film magnetic head according to claim 6, wherein a ratio of a thickness  
2 of said magnetic material having low coefficient of thermal expansion to a sum of thicknesses of  
3 said lower shield and said upper shield is 30% or more.

1                   10. A thin film magnetic head according to claim 9, wherein said magnetic  
2 material having low coefficient of thermal expansion is a crystalline magnetic alloy.

1                   11. A thin film magnetic head according to claim 9, wherein said magnetic  
2 material having low coefficient of thermal expansion is a NiFe alloy having a composition  
3 comprising 30 to 55 wt% Ni.

1                   12. A thin film magnetic head comprising:  
2                    a read unit, formed above a substrate, having a lower shield, a read element, and  
3                    an upper shield; and  
4                    a write unit having a lower pole piece, an upper pole piece, and a coil placed  
5                    between said lower pole piece and said upper pole piece,  
6                    said read unit and said write unit being separated from each other with a non-  
7                    magnetic material;  
8                    wherein a side shield is provide on each side of said read element, part of said  
9                    side shield being formed from a magnetic material having a low coefficient of thermal expansion  
10                  of  $11.5 \times 10^{-6}/K$  or less.

1                   13. A disk storage device comprising:  
2                    a recording medium;  
3                    a drive motor for driving said recording medium;  
4                    a magnetic head for reading and writing data from and on said recording medium;  
5                    a positioning mechanism for positioning said magnetic head;  
6                    a first circuit system for controlling said recording medium, said drive motor, said  
7                    magnetic head, and said positioning mechanism; and

8                   a second circuit system for supplying a write signal to said magnetic head and  
9 processing a read signal from said magnetic head;

10                   wherein said magnetic head comprises:

11                   a read unit, formed above a substrate, having a lower shield, a read  
12 element and an upper shield; and

13                   a write unit having a lower pole piece, an upper pole piece, and a coil  
14 placed between said lower pole piece and said upper pole piece,

15                   said read unit and said write unit being separated from each other with a  
16 non-magnetic material;

17                   a magnetic material having a low coefficient of thermal expansion of  
18  $11.5 \times 10^{-6}/K$  or less used for forming at least part of the lower shield or the upper shield.

1                   14. A disk storage device according to claim 13, wherein a flying height from an  
2 air bearing surface to said recording medium is 20 nm or less.